BASIS FOR THE AMENDMENT

The clams have been amended to better conform to accepted US claim format.

New Claims 11-20 have been added.

New Claims 11, 18, 19 and 20 are supported by Claim 1 as originally filed.

New Claims 12-13, 15-16 are supported at page 5, lines 9-13 of the specification.

New Claims 14 and 17 are supported at page 6, lines 14-20 of the specification.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 1-20 will now be active in this application.

INTERVIEW SUMMARY

Applicants wish to thank Examiner Niland for the helpful and courteous discussion with Applicants' Representative on February 15, 2007. During this discussion it was noted that the combination of US 6,518,389 (Kauhold et al), US 2001/0053841 (Kaufhold et al), US 2003/0055158 (König et al), US 5,789,528 (Martl et al), JP 2003-192783 (machine translation), and EP 0293253 (Ramey et al) fail to disclose or suggest the claimed **content of less than 100 ppm of titanium in the polyurethane. None of** US 6,518,389 (Kauhold et al), US 2001/0053841 (Kaufhold et al), US 2003/0055158 (König et al), US 5,789,528 (Martl et al), JP 2003-192783 (machine translation), and EP 0293253 (Ramey et al) **are concered with the reduction of yellowing of UV stabilized TPU or the reduction of hydrolysis of the TPU.**

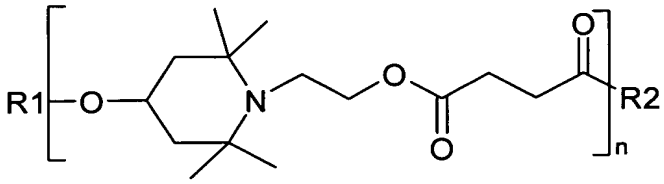
REMARKS

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The present invention as set forth in **Claim 1** relates to a thermoplastic polyurethane, comprising:

sterically hindered, esterified amine (I) which contains less than 100 ppm of titanium, based on the weight of (I),

wherein the following compound is present as (I) in the polyurethane:



wherein

n is an integer from 1 to 100,

R1 is a hydrogen atom or straight-chain, branched or cyclic alkyl of 1 to 12 carbon atoms, and

R2 is a hydrogen atom or straight-chain, branched or cyclic alkyl of 1 to 12 carbon atoms or is R1 or O-R1 or $N(R1)_2$ and **wherein the thermoplastic polyurethane has a total content of less than 100 ppm of titanium, based on the weight of (I).**

Claim 9 relates to a process for the preparation of a polyurethane in which **the sterically hindered esterified amine (I) contains less than 100 ppm of titanium, based on the weight of (I).**

Claim 10 relates to a film, shoe sole, roller, fiber, cladding in automobiles, wiper blade, hose, cable plug, bellows, trailing cable, cable sheath, seal, belt or damping element based on a thermoplastic polyurethane comprising sterically hindered, esterified amine (I) which contains less than 100 ppm, based on the weight of (I), of titanium, **the thermoplastic polyurethane**

having a total content of less than 100 ppm of titanium, based on the weight of (I).

Paragraph [0019] of the specification of the present invention discloses that:

> "Surprisingly, it has been found that esterified sterically hindered amine which was freed from residues of titanium-containing catalysts leads to substantially less yellowing of the polyurethane. In this context, freed means that titanium catalyst residues were deactivated, complexed, precipitated, filtered, absorbed or rendered harmless in another manner, or that no titanium was used as a catalyst during the esterification of the sterically hindered amine."

Further paragraph [0021] further discloses that:

> "Surprisingly, it has been found that this titanium is responsible for the discoloration of a UV-stabilized TPU during the synthesis. According to the invention, a sterically hindered esterified amine, in particular that of the formula 3 shown above, having a titanium content of <100 ppm, preferably <30 ppm, in particular <5 ppm, based in each case on the weight of the sterically hindered esterified amine, is therefore used in the novel polyurethane, in particular the thermoplastic polyurethane. Surprisingly, it has also been found that the hydrolysis of the TPU is reduced if a novel, sterically hindered esterified amine is used."

In contrast, the combination of US 6,518,389 (Kauhold et al), US 2001/0053841 (Kaufhold et al), US 2003/0055158 (König et al), US 5,789,528 (Martl et al), JP 2003-192783 (machine translation), and EP 0293253 (Ramey et al) fail to disclose or suggest the claimed **content of less than 100 ppm of titanium in the polyurethane.**

None of US 6,518,389 (Kauhold et al), US 2001/0053841 (Kaufhold et al), US 2003/0055158 (König et al), US 5,789,528 (Martl et al), JP 2003-192783 (machine translation), and EP 0293253 (Ramey et al) **are concered with the reduction of yellowing of UV stabilized TPU or the reduction of hydrolysis of the TPU.**

The sterically hindered esterified amine (I) in the claims of the present invention is a UV stabilizer. See page 3, lines 25-32 of the specification. Conventional sterically hindered esterified amines have **titanium contents of 120 to 200 ppm**. See page 5, lines 4 and 5 of the specification.

US 6,518,389 (Kauhold et al) and US 2001/0053841 (Kaufhold et al) do not disclose or suggest that a certain Ti content is detrimental for the color of TPU and can lead to yellowing.

US 2001/0053841 (Kaufhold et al) disclose that the use of Ti catalyst for the production of TPU. However, they are not concerned with the use of a sterically hindered esterified amines **which contain less than 100 ppm of titanium or the making of TPU which contains less than 100 ppm of titanium.**

US 2003/0055158 (König et al) discloses polyurethane coatings and not TPU. In Example 3 (table at page 4) concentrations of 1-2 wt% of Ti catalyst is used. This amount, while described as leading to yellowing, is significantly larger that the claimed amount of <100 ppm of Ti. Based on König et al, one of ordinary skill in the art would not have know how far the amount of Ti needs to be reduced in order to avoid yellowing. For example, concentration of Ti as small as 120 ppm as used in conventional sterically hindered esterified amines still lead to yellowing. See the Examples in Table 3 at page 16 of the specification.

In paragraph [0054], König et al disclose that:

> "The relatively high yellowing values for titanium(IV) catalysts under over-stoving conditions at 160°C/30 minutes with Δb =2.5-3.1 must be qualified to the effect that plastics do not withstand that temperature without deformation."

In other words, temperatures higher than 160°C should not be used for the polyurethane coatings because of deformation. However, TPU is processed at much higher temperatures that the polyurethane coatings of König et al. See for example the following documents which are attached herewith:

http://tpe-u.com/tpu/emea/en/tputechnology/47578/uniarticle.jsp?docId=47578

http://tpe-u.com/tpu/emea/en/tputechnology/47556/uniarticle.jsp?docId=47556

http://www.elastogran.de/ftp/elastollan_verarbeitung_en.pdf

All of the above documents (attached) show that TPU is processed at temperatures significantly higher than 160°C. Accordingly, a person of ordinary skill in the art would not

look at König et al (who use much lower temperatures than common for TPU) to solve the problem of yellowing and hydrolysis of TPU.

US 5,789,528 (Martl et al) discloses the production of **non-stabilized polyesters** using various catalysts, such as Ti catalysts. However, the polyesters are not used to make a thermoplastic polyurethane. A person of ordinary skill in the art would not have used US '528 to find a solution for lowering the **yellowing of UV stabilized TPU** or for the **reduction of hydrolysis of the TPU.**

Further, the transesterification catalysts of Hofacker and the non-Ti transesterification catalysts of Ramey can not be used in making the polyester polyols or polypiperidinyl succinates used in the PU compositions.

EP 0293253 (Ramey et al) disclose a polymer analogous transesterification in solution in which an acrylate polymer is functionalized. The acrylate polymer is prepared by radical polymerization is a prior reaction step. The first reaction step is the deprotonation of the 4-position of 2,2,6,6, tertramethyl-4-piperidinol (TMP-4-ol). However, this reaction is not preferred, because the methanol of the catalyst is more acidic than the secondary alcohol group of TMP-4-ol. Accordingly, the obtained methanol is immediately removed by distillation so that the equilibrium is moved in the direction of the deprotonation. In practice, alcoholates as catalysts are avoided because they react with moisture and thus dry conditions are necessary during the reaction which however is very costly.

In addition, if the alcoholate reacts with water the result is alcohol and a OH ion which reacts with the ester to form an acid. This in turn results in a salt of the acid. Thus, the reaction of the alcoholate with water is detrimental for the equilibrium of the reaction system. A complete reaction cannot be achieved. However, a complete reaction is necessary to obtain high molecular weights. Also, removal of the salt is difficult because one would have to work in an acidic medium which is not possible when using piperidin (which is basic and not acidic).

Thus, stabilizer obtained by the methods of Ramey would contain large amounts of alkali which are detrimental in the production of the TPU because the alkali leads to crosslinking reactions (isocyanurate) which make the TPU useless.

Further, the alcoholate is sensitive to oxidation. Thus, a transesterification would have to proceed while excluding moisture and oxygen which again increase the production costs dramatically and making such process undesirable for industrial use. Traces of oxygen also would lead to a discoloration of the stabilizer, making the same commercially undesirable.

If large amount of Ti catalyst are used, reasonable reaction times may be achieved. However, this results in the very problems that the present invention solves, namely yellowing of TPU and hydrolysis.

Therefore, the rejection of Claims 1-10 under 35 U.S.C. § 103(a) over US 6,518,389 (Kauhold et al), US 2001/0053841 (Kaufhold et al), US 2003/0055158 (König et al), US 5,789,528 (Martl et al), JP 2003-192783 (machine translation), and EP 0293253 (Ramey et al) is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

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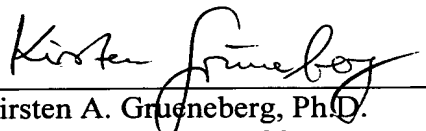

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